

# Stuff for Monday, May 21, 2012

- PS #15 due up front.
- Quiz #7 returned. Class average: 9.0 (not bad!)
- Schedule for last two weeks (final on Thursday of finals week):
  - 1094 session each Wednesday and quiz each Friday
  - PS #17 due Tuesday (Monday holiday)

T4, T5, and T6 stuff:

- *macrostate* specified by macroscopic variables (e.g., 3 of  $P$ ,  $V$ ,  $N$ ,  $T$  for ideal gas)
- *microstate* specified by quantum state of *every* molecule
- *multiplicity*  $\Omega$  is number of microstates with same macrostate (e.g., same  $U$ ,  $N$ )
- macropartition table given  $\Omega(U, N)$  uses  $U = U_A + U_B = \text{constant}$ ;  $\Omega_{AB} = \Omega_A \times \Omega_B$
- fundamental assumption: each accessible microstate is equally probable  
 $\implies$  relative probabilities of macropartitions equals ratio of (total) multiplicities
- Einstein solid with oscillator energy  $\varepsilon = \hbar\omega$ :
  - $\Omega(N, U) = \frac{(3N + U/\varepsilon - 1)!}{(3N - 1)!(U/\varepsilon)!}$        $U = \sum_i^{3N} n_i \varepsilon$        $U = 3Nk_B T$
- Entropy  $S = k_b \ln \Omega$ , so  $\Omega = e^{S/k_b}$ ; for systems  $A$  and  $B$ ,  $S_{AB} = S_A + S_B$ 
  - $\partial S / \partial U = 1/T$  defines temperature (hold other variables fixed)

## Events this week

- Physics Picnic on Tuesday, 11am–1pm.  
Free food! You are all invited!
- Pre-quiz blood-letting on Friday: blood drive in PRB